tration of his subject. They should be important, as they respect the science they are applied to, yet clear, and such as may easily and generally be understood. They should rather approach to simplicity, and explain the established principles of the subject, than be elaborate and apply to minute phenomena only. I speak here (be it understood) of those lectures which are delivered before a mixed audience, and the nature of which will not admit of their being applied to the explanation of any but the principal parts of a science. If to a particular audience you dwell on a particular subject, still adhere to the same principle, though perhaps not exactly to the same rule. Let your experiments apply to the subject you elucidate, do not introduce those which are not to the point.

"Though this last part of my letter may appear superfluous, seeing that the principle is so evident to every capacity, yet I assure you, dear A., I have seen it broken through in the most violent manner—a mere alehouse trick has more than once been introduced in a lecture, delivered not far from Pall Mall, as an elucidation of the laws of motion.

"Neither should too much stress be laid upon what I would call small experiments, or rather illustrations. It pleases me well to observe a neat idea enter the head of a lecturer, the which he will immediately and aptly illustrate or explain by a few motions of his hand—a card, a lamp, a glass of water, or any other thing that may be by him; but when he calls your attention in a particular way to a decisive experiment that has entered his mind, clear and important in its application to the subject, and then lets fall a card, I turn with disgust from the lecturer and his experiments. 'Tis well, too, when the lecturer has the ready wit and the presence of mind to turn any casual circumstance to an illustration of his subject. Any particular circumstance that has become table-talk for the town, any local advantages or disadvantages, any trivial circumstance that may arise in company, give great force to illustrations aptly drawn from them, and please the audience highly, as they conceive they perfectly understand them.

"Apt experiments (to which I have before referred) ought to be explained by satisfactory theory, or otherwise we merely patch an old coat with new cloth, and the whole (hole) becomes worse. If a satisfactory theory can be given, it ought to be given. If we doubt a received opinion, let us not leave the doubt unnoticed, and affirm our own ideas, but state it clearly, and lay down also our objections. If the scientific world is divided in opinion, state both sides of the question, and let each one judge for himself, by noticing the most striking and forcible circumstances on each side. Then, and then only, shall we do justice to the subject, please the audience, and satisfy our honour, the honour of a philosopher."

We trust that during the ensuing session, these opinions of Faraday may be in the minds of every lecturer on Science.

ECKER'S "CONVOLUTIONS OF THEB RAIN"

On the Convolutions of the Human Brain. By Dr. Alexander Ecker, Professor of Anatomy and Comparative Anatomy in the University of Freiburg, Baden. Translated, by permission of the author, by John C. Galton, M.A., Oxon., M.R.C.S., F.L.S., &c., &c. Translator of Prof. Roser's "Manual of Surgical Anatomy," &c. (London: Smith, Elder, & Co., 1873.)

OF late years the topographical anatomy of the surface of the brain has deservedly attracted considerable attention; and the recent able investigations of Hughlings Jackson and Ferrier have shown the importance, in fact the absolute necessity of a correct and generally recognised description and enumeration of the cerebral convolutions. Mr. Galton therefore deserves the thanks of all interested in the subject, for having introduced to us in English dress this valuable monograph by Prof. Ecker of Freiburg.

There are two methods by which the complex human brain may be analysed and reduced to its simpler elements, two paths that lead to the same goal; the one is by a careful examination and comparison of the brains of the lower animals, and especially of apes, which latter in their higher groups present a "sketch map" as it were, which is filled in and completed in man only. This has been carried out with great success by Gratiolet primarily, and in England it has been followed amongst others by Huxley, Marshall, Flower and Rolleston. The other method is by tracing the development of the fœtal brain, and observing which fissures, and therefore which convolutions, are the first to make their appearance, and so are of primary importance, and how these subsequently undergo farther evolution and complication. Tiedemann and Reichert have hitherto been our authorities on this point, and it is by this method chiefly that Prof. Ecker arrives at his conclusions.

In this country the admirable little treatise of Prof. Turner has been welcomed and the classification therein adopted is now generally accepted, and taught in several of our anatomical schools. Prof. Ecker in the main follows Prof. Turner, although the nomenclature, of course, is that of the German school, and so differs occasionally from ours, which follows rather Gratiolet and the French school. The synonyms are, however, in all cases faithfully given.

The author insists upon the essential difference between the Sylvian fissure and the other sulci, these being mere indentations of the cortex, whilst that is formed by the folding of the temporo-sphenoidal lobe on the fore part of the brain during its development. The anterior or ascending branch of this fissure is here correctly described as being short and arrested by the hinder end of the lower frontal convolution, whilst that described as such by Prof. Turner is a distinct sulcus (præcentral) terminating close behind the ascending ramus. The gyrus connecting the inferior and ascending frontal (anterior central) convolutions is always present, although it is not always superficial, being occasionally concealed by the over-lapping of those convolutions. Instead of the orbital lobule usually described on the under surface of the frontal lobe, the three frontal convolutions are traced round the apex to the orbital surface. The narrow ridge internal to the olfactory sulcus (gyrus rectus) is regarded as the continuation of the first, the gyrus between that and the orbital sulcus as the second, and outside the last as the third. We should rather consider all internal to the orbital sulcus as first frontal, which is grooved by a special olfactory sulcus, and the second as ending posteriorly between the anterior branches of the triradiate orbital sulcus. The marginal convolution is regarded as simply the inner surface of the superior frontal.

In the parietal lobe the supra-marginal and angular convolutions are amongst the most difficult in the brain to indicate and circumscribe. Prof. Ecker describes the

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supra-marginal convolution as arching over the end of the fissure of Sylvius and joining the upper temporo-sphenoidal convolution, and the angular as folding over the hinder end of the parallel fissure and joining the middle temporo-sphenoidal convolution. This description, and it is supported by our experience, is not quite in accordance with that of some other anatomists; for instance, in Mr. Marshall's well-known essay on the brain of the bushwoman, the supra-marginal convolution is correctly defined thus, whilst the angular would require the anterior enlarged portion of the third annectent gyrus, as marked in the figure, to complete its bend and unite it to the second temporal gyrus. Similarly, in the idiot boy's brain, the angular gyrus would be a large folded convolution, there indicated as the bifurcated anterior extremity of the second annectent convolution; and in the idiot woman the parallel fissure extends so far back that it quite cuts off the angular gyrus from the temporo-sphenoidal, and the convolution is represented by the straight, also bifurcated fore part of the second annectent gyrus in the figure. The intra-parietal fissure of Turner is here called less correctly inter-parietal.

In the occipital lobe, a tolerably constant transverse depression, into which the intra-parietal fissure often debouches is appropriately named "occipital sulcus." Prof. Ecker regards the bridging, or annectent convolutions, as unworthily distinguished by special names in the human brain, since they do not bridge over any fissure as in the lower apes. He carefully points out their homology with those gyri in the ape, yet deprecates the transference of the names from the Simian to the human brain. But this comparison and correspondence of nomenclature is precisely what we require for the satisfactory determination of the cerebral functions, and the homological significance of a part is quite sufficient to justify the application of the same name to it. So also, on the inner surface, the lower annectent gyrus is described as the "gyrus cunei," and the occasional presence of the upper annectent gyrus is alluded to, of which we have now seen several examples. The operculum of the ape's brain is discussed, but the same term is unfortunately here applied to quite a different part of the human brain, viz. the united lower ends of the ascending frontal and parietal convolutions which overhang the island of Reil.

The middle convolution on the under surface of the occipito-temporal lobes is regarded, not without precedent, as the direct continuation of the gyrus fornicatus, and the uncinate gyrus of Huxley thus comes to be divided into three parts, the "lingual lobule" behind the union of the two gyri, the "convolution of the Hippocampus" immediately below the dentate fissure, and the recurved hook or "uncinate lobule"; but the connection between the gyrus fornicatus and this convolution is small and narrow, whilst that between it and the lingual lobule is large and direct; further, the author points out, after Gratiolet, that in many apes the calcarine is prolonged into the dentate fissure and cuts off the arched from the uncinate gyrus; surely this shows the essential unity of the uncinate convolution, and that the junction with the gyrus fornicatus is a superadded and secondary element in the human and certain Simian brains.

The translator has generally performed his work well; there are, however, one or two slips; for instance, the dentate fissure is said to produce an eminence in the floor of the *posterior* corner of the lateral ventricle; the parieto-occipital fissure also is described correctly as being concave forwards, whilst in the diagram it is represented as convex: the figures are exceedingly clear. Prefixed is an exhaustive bibliography by the translator, which adds materially to the value of the work; and finally, we can cordially recommend it as an accurate and lucid guide to a somewhat difficult study.

G. D. T.

OUR BOOK SHELF

The Zoological Record for 1871. Edited by Prof. Newton. (J. Van Voorst, 1873.)

THE birth of true biological science is of so recent origin, and its development has been so rapid that until lately many of the necessary steps in the furtherance of its proper progress have remained beyond the cognizance of its most enthusiastic followers. The difficulties connected with, and the unmanageableness of the large number of facts accumulated day by day on all branches of zoology, and recorded by observers in all parts of the civilised world, have until lately been scarcely realised. Only by those who, from the disappointment which they have experienced on finding that observations which have cost them incalculable time and labour, have been previously undertaken and exhausted by others before them, either in their own or some other country, appreciate fully the necessity for an easily accessible, accurate, and not over ponderous account of the labours of previous workers.

It is only the full appreciation of the advantage to future science students which stimulates the authors of the several parts of the work before us to continue and commence their contributions to this, what may be truly termed, labour of love. The labour involved in obtaining a complete and condensed account of the gist of each zoological paper published here or elsewhere throughout a year, is so great, and the smallness of the class who are disposed to purchase the work when produced, so necessarily restricted, that at first sight it is evident that it is only with the assistance of donations from scientific bodies, or from contributions of one kind or another on the part of amateurs in the subject, that the necessary expenses can be covered and the staff maintained.

These considerations will recommend this valuable work to the consideration of all interested in zoological progress.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

On the Equilibrium of Temperature of a Gaseous Column subjected to Gravity

SINCE reading Principal Guthrie's first letter on this subject (vol. viii. p. 67), I have thought of several ways of investigating the equilibrium of temperature in a gas acted on by gravity. One of these is to investigate the condition of the column as to density when the temperature is constant, and to show that when this is fulfilled the column also fulfils the condition that there shall be no upward or downward transmission of energy; or, in fact, of any other function of the masses and velocities of the molecules. But a far more direct and general method was suggested to me by the investigation of Dr. Ludwig Boltzmann* on the final distribution of energy in a finite system of elastic bodies. A sketch of this method as applied to the simpler case of a number of molecules so great that it may be treated as infinite, will be found on p. 535. Principal Guthrie's second letter (vol. viii. p. 486) is especially valuable as stating his case in the form of distinct propositions, every one of

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* Studien über das gleichgewicht der lebendigen Kraft zwischen bewegten materiellen Punkten. Von Dr. Ludwig Boltzmann. Sitzb. d. Akad. d. Wissensch, October 8, 1868 (Vienna).

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